Peakview Environmental LLC

January 10, 2018

Claudia Smith
Tribal NSR Permits Lead
USEPA Region 8
1595 Wynkoop Street
Denver, CO 80202

**RE: Oil and Natural Gas Minor Source Registration Form Part 2 – Emission and Production Information**
**EP Energy E&P Company, L.P.**
**Eula Ute 1-16A1 Well Site**

Dear Ms. Smith:

On behalf of EP Energy E&P Company L.P. (EP Energy), Peakview Environmental, LLC (Peakview) is submitting the enclosed Oil and Natural Gas Minor Source Registration Form Part 2 – Emission and Production Information for the Eula Ute 1-16A1 well site and tank battery.

Please contact Joe Araiza, EP Energy at joe.araiza@epenergy.com or me at julie@juliespear.com with any questions.

Sincerely,

PEAKVIEW ENVIRONMENTAL, LLC

Julie Spear

Julie Spear, PE
Principal Engineer

Enclosures

cc: Joe Araiza, EP Energy
Bruce Pargeets, Director, Ute Indian Tribe Energy & Minerals Department
Minnie Grant, Air Coordinator, Ute Indian Tribe Energy & Minerals Department

EPA Form No. 5900-391
EPA ICR No. 1230.27
OMB Control No. 2060-0003
Approval expires 4/30/2017

United States Environmental Protection Agency
http://www.epa.gov/air/tribal/tribalnsr.html

# Part 2: Submit Within 60 Days After Startup of Production -- Emission and Production Information

# FEDERAL IMPLEMENTATION PLAN FOR TRUE MINOR SOURCES IN INDIAN COUNTRY IN THE OIL AND NATURAL GAS PRODUCTION AND NATURAL GAS PROCESSING SEGMENTS OF THE OIL AND NATURAL GAS SECTOR

## Registration for New True Minor Oil and Natural Gas Sources and Minor Modifications at Existing True Minor Oil and Natural Gas Sources

**Please submit information to:**

Attn: Ms. Claudia Smith
Air Program (8P-AR)
1595 Wynkoop Street
Denver, CO 80202-1129
Phone: 303-312-6520
Email: smith.claudia@epa.gov

&

Attn: Minnie Grant
P.O. Box 70
988 South 7500 East
Fort Duchesne, UT 84026
Phone: 435-722-5141
Email: minnieg@utetribe.com

**A. GENERAL SOURCE INFORMATION (See Instructions Below)**

| | |
|---|---|
| **1. Company Name**<br>EP Energy E & P Company, L.P. | **2. Source Name**<br>Eula Ute 1-16A1 |
| **3. Type of Oil and Natural Gas Operation**<br>Oil and Gas Well Site | **4. New Minor Source?** ☒ **Yes** ☐ **No**<br>**5. True Source Modification?** ☐ **Yes** ☒ **No** |
| **6. NAICS Code**<br>211111 | **7. SIC Code**<br>1311 |
| **8. U.S. Well ID(s) or API Number(s) [if applicable]**<br>43-013-30782 | |

| **9. Area of Indian Country** | **10. County** | **11a. Latitude** | **11b. Longitude** |
|---|---|---|---|
| Uintah and Ouray Reservation | Duchesne | 40.39508 (NAD 83) | -109.99796 (NAD 83) |

**B. CONTACT INFORMATION (See Instructions Below)**

| | |
|---|---|
| **1. Owner Name**<br>EP Energy E&P Company, L.P. | Title<br>Asset Owner |
| Mailing Address<br>P.O Box 4660<br>Houston, TX 77210-4660 | |
| Email Address<br>joe.araiza@epenergy.com | |
| Telephone Number<br>713-997-5452 | Facsimile Number<br>713-455-8380 |
| **2. Operator Name** (if different from owner)<br>(Same as Owner) | Title |
| Mailing Address | |
| Email Address | |
| Telephone Number | Facsimile Number |
| **3. Source Contact**<br>Jeff Crozier | Title<br>Landman |
| Mailing Address<br>17900 West 3750 North<br>Altamont, UT 84001 | |
| Email Address<br>jeff.crozier@epenergy.com | |
| Telephone Number<br>435-823-4999 | Facsimile Number<br>N/A |

| **4. Compliance Contact**<br>Joe Araiza | Title<br>Environmental & Regulatory Manager |
|---|---|
| Mailing Address<br>P.O. Box 4660<br>Houston, TX 77210-4660 | |
| Email Address<br>joe.araiza@epenergy.com | |
| Telephone Number<br>713-997-5452 | Facsimile Number<br>713-455-8380 |

## C. EMISSIONS AND OTHER SOURCE INFORMATION **See attached document**

Include all of the following information in the table below and as attachments to this form:

*Note: The emission estimates can be based upon actual test data or, in the absence of such data, upon procedures acceptable to the Reviewing Authority. The following procedures are generally acceptable for estimating emissions from air pollution sources: (1) unit-specific emission tests; (2) mass balance calculations; (3) published, verifiable emission factors that are applicable to the unit (i.e., manufacturer specifications); (4) other engineering calculations; or (5) other procedures to estimate emissions specifically approved by the Reviewing Authority. Guidance for estimating emissions can be found at http://www.epa.gov/ttn/chief/efpac/index.html.*

[X] Narrative description of the operations.

[X] Identification and description of any air pollution control equipment and compliance monitoring devices or activities.

[X] Type and actual amount (annually) of each fuel that will be used.

[X] Type of raw materials used (e.g., water for hydraulic fracturing).

[X] Actual, annual production rates.

[X] Actual operating schedules.

[X] Any existing limitations on source operations affecting emissions or any work practice standards, where applicable, for all regulated New Source Review (NSR) pollutants at your source. Indicate all requirements referenced in the Federal Implementation Plan (FIP) for True Minor Sources in Indian Country in the Oil and Natural Gas Production and Natural Gas Processing Segments of the Oil and Natural Gas Sector that apply to emissions units and air pollution generating activities at the source or proposed. Include statements indicating each emissions unit that is an emissions unit potentially subject to the requirements referenced in the FIP, but does not meet the definition of an affected facility under the referenced requirement, and therefore, is not subject to those requirements.

[X] For each emissions unit comprising the new source or modification, estimates of the total allowable (potential to emit) annual emissions at startup of production from the air pollution source for the following air pollutants: particulate matter, $PM_{10}$, $PM_{2.5}$, sulfur oxides ( ), nitrogen oxides ($NO_x$), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, fluorides (gaseous and particulate), sulfuric acid mist ($H_2SO_4$), hydrogen sulfide ($H_2S$), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates. Allowable annual emissions are defined as: emissions rate of an emissions unit calculated using the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical

or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation, or the effect it would have on emissions, is legally and practically enforceable. You must determine the potential for emissions within 30 days from the startup of production.

☒ For each emissions unit comprising the new source or modification, estimates of the total actual annual emissions during the upcoming, consecutive 12 months from the air pollution source for the following air pollutants: particulate matter (PM, $PM_{10}$, $PM_{2.5}$), sulfur oxides ($SO_x$), nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, ammonia ($NH_3$), fluorides (gaseous and particulate), sulfuric acid mist ($H_2SO_4$), hydrogen sulfide ($H_2S$), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates. Estimates of actual emissions must take into account equipment, operating conditions, and air pollution control measures. You should calculate an estimate of the actual annual emissions using estimated operating hours, production rates, in-place control equipment, and types of materials processed, stored, or combusted.

## D. TABLE OF ESTIMATED EMISSIONS

Provide in the table below estimates of the total allowable annual emissions in tons per year (tpy) and total actual annual emissions (tpy) for the following pollutants for all emissions units comprising the new source or modification.

| POLLUTANT | TOTAL ALLOWABLE ANNUAL EMISSIONS (TPY) | TOTAL ACTUAL ANNUAL EMISSIONS (TPY) |
|---|---|---|
| **PM** | 0.61 | 0.61 |
| **$PM_{10}$** | 0.31 | 0.31 |
| **$PM_{2.5}$** | 0.31 | 0.31 |
| **$SO_x$** | 0.02 | 0.02 |
| **$NO_x$** | 7.93 | 7.93 |
| **CO** | 18.54 | 18.54 |
| **VOC** | 10.21 | 10.21 |
| **Pb** | N/A | N/A |

| POLLUTANT | TOTAL ALLOWABLE ANNUAL EMISSIONS (TPY) | TOTAL ACTUAL ANNUAL EMISSIONS (TPY) |
|---|---|---|
| **NH3** | N/A | N/A |
| **Fluorides** | N/A | N/A |
| **$H_2SO_4$** | N/A | N/A |
| **$H_2S$** | N/A | N/A |
| **TRS** | N/A | N/A |

**Instructions for Part 2**

Please answer all questions. If the item does not apply to the source and its operations write "n/a". If the answer is not known write "unknown".

**A. General Source Information**

1. Company Name: Provide the complete company name. For corporations, include divisions or subsidiary name, if any.
2. Source Name: Provide the source name. Please note that a source is a site, place, or location that may contain one or more air pollution emitting units.
3. Type of Operation: Indicate the generally accepted name for the oil and natural gas production or natural gas processing segment operation (e.g., oil and gas well site, tank battery, compressor station, natural gas processing plant).
4. New True Minor Source: [Per Federal Indian Country Minor New Source Review Rule, 40 CFR 49.153].
5. True Minor Source Modification: [Per Federal Indian Country Minor New Source Review Rule, 40 CFR 49.153].
6. North American Industry Classification System (NAICS): The NAICS Code for your oil and natural gas source can be found at the following link for North American Industry Classification System: http://www.census.gov/eos/www/naics/.
7. Standard Industrial Classification Code (SIC Code): Although the new NAICS code has replaced the SIC codes, much of the Clean Air Act permitting processes continue to use these codes. The SIC Code for your oil and natural gas source can be found at the following link for Standard Industrial Classification Codes: http://www.osha.gov/pls/imis/sic_manual.html.
8. U.S. Well ID or API Number: Unique well identifier as assigned by the Federal or State oil and gas regulatory agency with primacy, using the American Petroleum Institute (API) Standard for number format (pre-2014) or the Professional Petroleum Data Management (PPDM) Association US Well Number Standard (2014-present). Provide IDs for all oil and natural gas production wells associated with the facility, if applicable. May not be applicable for downstream production sources, such as compressor stations.
9. Area of Indian Country: Provide the name of the Indian reservation within which the source is operating.
10. County: Provide the County within which the source is operating.
11. Latitude & Longitude (11a. and 11b.): Provide latitude and longitude location(s) in decimal degrees, indicating the datum used in parentheses. These are GPS (global positioning system) coordinates. This information should be provided in decimal degrees with 6 digits to the right of the decimal point, indicating the datum used in parentheses (i.e., NAD 27, NAD 83, WGS 84 – WGS 84 is preferred over NAD 27).

**B. Contact Information**

Please provide the information requested in full.

1. Owners: List the full name (last, middle initial, first) of all owners of the source.
2. Operator: Provide the name of the operator of the source if it is different from the owner(s).
3. Source Contact: The source contact must be the local contact authorized to receive requests for data and information.
4. Compliance Contact: The compliance contact must be the local contact responsible for the source's compliance with this rule. If this is the same as the Source Contact please note this on the form.

**C. Attachments**

The information requested in the attachments will enable the U.S. Environmental Protection Agency (EPA) to understand the type of oil and natural gas source being registered and the nature and extent of the air pollutants to be emitted.

**Disclaimers:**

The public reporting and recordkeeping burden for this collection of information is estimated to average 6 hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

Information in these forms submitted in compliance with the final Federal Indian Country Minor NSR rule may be claimed as confidential. A company may assert a claim of confidentiality for information submitted by clearly marking that information as confidential. Such information shall be treated in accordance with EPA's procedures for information claimed as confidential at 40 CFR part 2, subpart B, and will only be disclosed by the means set forth in the subpart. If no claim of confidentiality accompanies the report when it is received by EPA, it may be made public without further notice to the company (40 CFR 2.203).

# NEW MINOR SOURCE REGISTRATION - PART 2 ATTACHMENT

## Eula Ute 1-16A1
## Remote Location
## Duchesne County, Utah

**Prepared For:** EP ENERGY

EP Energy E&P Company, L.P.
P.O. Box 4660
Houston, Texas 77210-4660

**Submitted By:** Peakview Environmental LLC

2412 Iris Avenue
Boulder, Colorado 80304

**January 2018** **Project No. EP0182016**

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## List of Appendices

# 1.0 INTRODUCTION

EP Energy E&P Company L.P. (EP Energy) owns and operates the Eula Ute 1-16A1 site, a new oil and gas production site located in Duchesne County, Utah. The site services one well, Eula Ute 1-16A1, API# 43-013-30782.

The Oil and Gas New Minor Source Registration Part 1 Form was submitted to EPA on July 28, 2017. Production commenced at the site on November 20, 2017.

## 1.1 Site Description

The EP Energy has installed and is operating the following equipment and emission sources at the site:

- Two (2) 500-barrel (bbl) oil storage tanks
- One (1) 500-bbl produced water storage tank
- One (1) 500-bbl overflow storage tank
- One (1) heater treater and various natural gas-fired heaters ≤7.5-MMBtu/hr combined total
- Controlled oil truck loading – emissions routed to flare
- Produced water truck loading
- One (1) 7.7-MMBTU/hr flare
- Four (4) intermittent-bleed pneumatic controllers
- One (1) 300-hp natural gas-fired generator engine
- Equipment fugitives
- Miscellaneous storage containers (motor oil, methanol, glycol, etc.) ≤500 gallons each and combined capacity of ≤ 1,600 gallons
- Electric pump jack

## 2.0 PROCESS DESCRIPTION

The Eula Ute 1-16A1 site includes one wellhead with separation and storage capability. The site will produce up to 150,000 barrels of oil per year (BOPY) or 411 barrels of oil per day (BOPD). The site will operate 8,760 hours per year. A general process flow diagram and applicable in Appendix A of this document. A site plan is included in Appendix B.

Well production is brought to the surface via an electric pump jack and routed to a heater treater to separate the well fluids into three constituent phases: oil, gas and water. The separated oil phase is routed to the oil storage tanks prior to truck transport offsite to sales. The separated water phase is routed to the heated produced water storage tank prior to being transported offsite for disposal. Both oil and produced water are transferred to tanker trucks utilizing the submerged loading method. The separated gas phase is routed to the gas sales pipeline. During an emergency upset condition oil or produced water may be rerouted to a produced water tank will be utilized as an overflow tank.

The natural gas fuel for the heaters and the generator engine is buy-back gas from the natural gas processing plant and is assumed to be pipeline specification quality. The total rating for all heaters is ≤ 7.5-MMBtu/hr.

Oil storage tank and produced water tank emissions are routed to a flare for ≥98% control of volatile organic compounds (VOCs). The crude oil loading emissions are routed to the flare via a vapor recovery line. The vapor capture efficiency is 70% and flare control efficiency is ≥98%. Produced water emissions are assumed to be negligible due to the low concentrations of dissolved VOCs present in the produced water and therefore produced water loading emissions are not controlled.

Site loads may be powered by a natural gas-fired generator or supplied electricity.

# 3.0 EMISSION CALCULATIONS

Emissions calculations for the emission sources at the site are included in Appendix C of this document. Calculation methodologies for each emission source are discussed in the following sections.

## 3.1 Representative Analysis

Emission calculations are based on a liquid sample collected from the separator at the Powell 2-13A2 facility on 6/17/16. Laboratory analysis of the flash gas evolved from hydrocarbon liquid and extended hydrocarbon analysis of the liquids were conducted on the sample. The laboratory report is included in Appendix B.

## 3.2 Storage Tanks

### *3.2.1 Oil Storage Tanks*

Tank flash losses from the oil storage tanks were calculated using the gas-to-oil ratio (GOR) measured by laboratory procedures method and the flash gas composition from the laboratory flash liberation of liquid hydrocarbon analysis.

Working and standing emission losses from the oil storage tanks were calculated using EPA TANKS 4.09d (using Windows XP platform) to determine total annual emissions from the tanks. The output from a Promax simulation using the stable oil option was used to speciate the total emissions from the TANKs report. The detailed TANKs report and the Promax output are included in Appendix B.

The flash and working and standing storage tank emissions are routed to the flare for 98% VOC control.

### *3.2.2 Produced Water Storage Tank*

The well fluids undergo separation in the heater treater where oil/water/gas are separated. Low levels of dissolved hydrocarbons remain in the produced water and VOC emissions from the water storage tank are assumed to be negligible.

### *3.2.3 Overflow Storage Tank*

One produced water tank is utilized as an overflow tank and will remain empty except in emergency upset conditions when either the oil or produced water tanks are rerouted to the overflow tank. The overflow tank is emptied when practicable following the upset event. Total site production/throughput is not affected by the use of the of the overflow tank therefore; use of the tanks does not affect the site-wide VOC emissions.

### *3.2.4 Methanol and Glycol Storage Tanks*

Emissions from the methanol tank were calculated using EPA TANKs v4.09d. Emissions for the glycol storage tank are negligible and are not included in the site-wide emissions.

## 3.3 Crude Oil and Produced Water Loading

Crude oil truck loading emissions were calculated using the AP-42 Section 5.2, equation 1 and submerged loading constants from Table 5.2-1. The crude oil loading emissions will be routed to the flare via a vapor capture line. The capture efficiency is 70% and flare control efficiency is ≥98%. Produced water emissions are assumed to be negligible due to the low concentrations of dissolved VOCs present in the produced water and therefore produced water loading emissions are not controlled.

## 3.4 Heaters

The combined heater emissions were calculated using AP-42 Section 1.4 emission factors. Pipeline quality natural gas is used as fuel for the heaters.

## 3.5 Pneumatic Controllers

The pneumatic controller emissions were calculated using the number of controllers, average annual hours of operation and UDAQ intermittent-bleed pneumatic controller emission factor.

## 3.6 Equipment Fugitives

Equipment fugitives were calculated using the flash gas composition and 40 CFR 98 Subpart W emission factors. Component counts were estimated based on 40 CFR 98, Subpart W, Table W-1B.

## 3.7 Internal Combustion Engine

The generator engine emissions were calculated using manufacturer supplied data and AP-42 emission factors and pipeline quality natural gas as fuel.

## 3.8 Flare/Combustion Device

Flare emissions were calculated using the tank emissions routed to the flare as fuel. A minimum 98% destruction efficiency was used to calculate VOC emissions and AP-42 Section 13 emission factors for criteria pollutants.

# 4.0 FEDERAL RULE APPLICABILITY ANALYSIS

The following section addresses the applicability the eight Federal Standards included in the Oil and Natural Gas FIP for Indian Country.

The facility is not located within a designated non-attainment area for purposes of determining Federal Non-Attainment New Source Review permitting applicability, the Facility is not an existing major source for purposes of evaluating the applicability of Prevention of Significant Deterioration (PSD) review requirements.

## 4.1 New Source Performance Standards (40 CFR Part 60)

Subpart IIII: Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

This subpart is not applicable, there are no compression ignition internal combustion engines at the site.

Subpart JJJJ: Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

This subpart is applicable to spark ignited (SI) internal combustion engines manufactured after July 1, 2007. The 300-hp natural-gas-fired, lean-burn engine was manufactured after the applicability date and will be subject to the provisions of this subpart. The engine is certified by the manufactured as meeting the emissions requirements of Subpart JJJJ.

Subpart Kb: Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced after July 23, 1984

This subpart does not apply to the storage tanks because they are used to store petroleum or condensate prior to custody transfer, and the design capacity of each tank does not exceed 1,589.874 m3 (3,061,721 gallons) according to 40 CFR §60.110b(d)(4).

Subpart KKKK: Standards of Performance for New Stationary Combustion Turbines

There are no stationary combustion turbines located at the site; therefore, this subpart does not apply.

Subpart OOOOa: Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution

The site is subject to this subpart since the well was refractured and storage tanks installed after the September 18, 2015 applicability date. Therefore; the site will comply with the applicable requirements of 40 CFR of this subpart for the well, oil storage tanks, controls and facility leak detection and repair.

## 4.2 National Emission Standards for Hazardous Air Pollutants (40 CFR Part 63)

Subpart DDDDD: National Emission Standards for Major Sources: Industrial, Commercial and Institutional Boilers and Process Heaters

The site is not a major source therefore the site is not subject to this subpart.

Subpart HH: National Emissions Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities

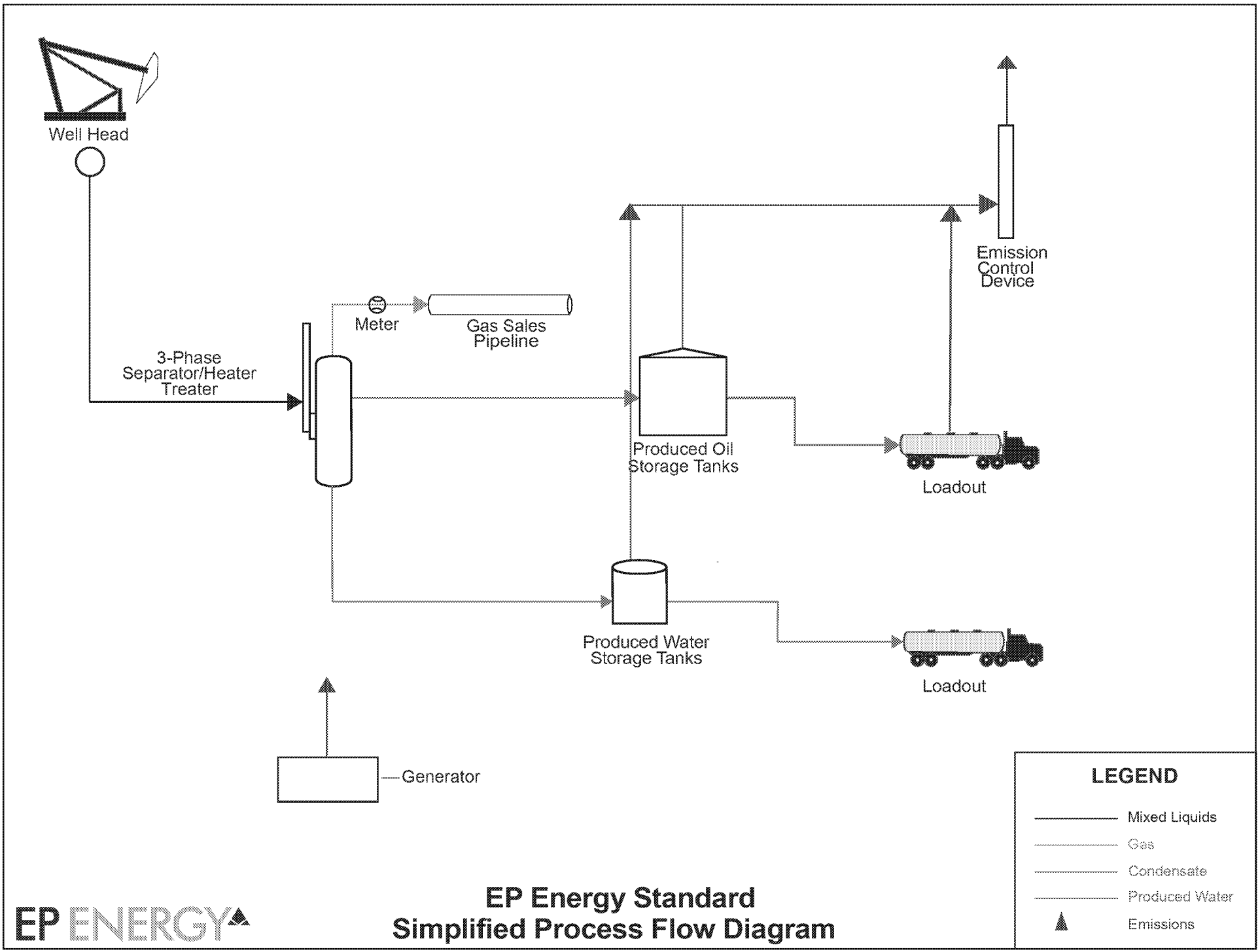
The facility does not have a TEG dehydration unit. Therefore, the facility is not subject to this subpart according to 40 CFR §63.760(b)(2).

Subpart ZZZZ: National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

The natural-gas-fired compressor engine is a new stationary reciprocating internal combustion engine (RICE) at an area source of HAP emissions, as defined in 40 CFR §63.6590(c)(1). As specified in 40 CFR §63.6590(c)(1), the engine will meet the requirements of this subpart by meeting the requirements of 40 CFR 60, Subpart JJJJ.

# APPENDIX A

## Process Flow Diagram and Site Plan


Well Head
3-Phase
Separator/Heater
Treater
Meter
Gas Sales
Pipeline
Emission
Control
Device
Produced Oil
Storage Tanks
Loadout
Produced Water
Storage Tanks
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Generator
LEGEND
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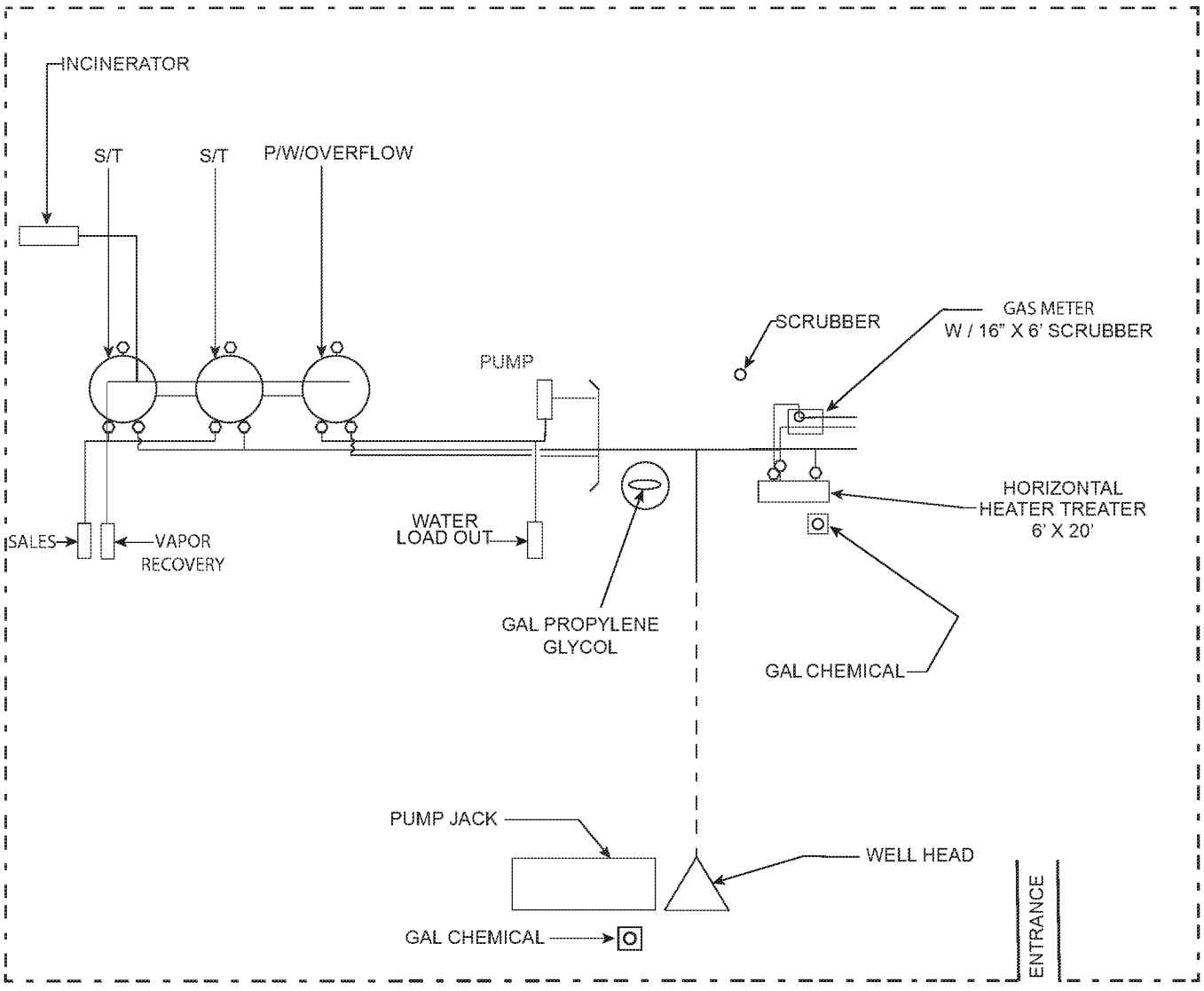
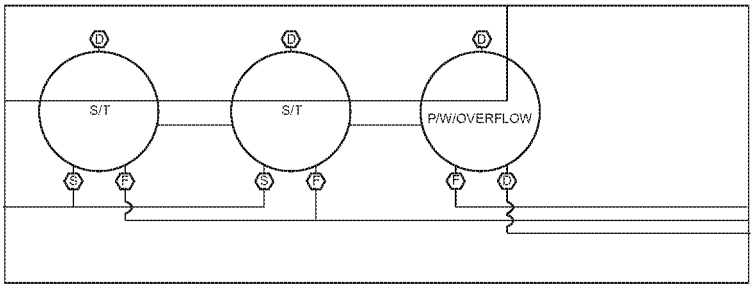
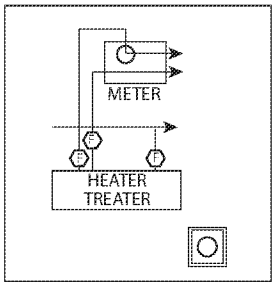
Condensate
Produced Water
Emissions
EP ENERGY
EP Energy Standard
Simplified Process Flow Diagram




SITE PLAN
N.T.S.




Valve Detail A
N.T.S.




Valve Detail B
N.T.S.

LEGEND:

- LDAR OBSERVATION PATH
- ABOVE GROUND LINES
- BURIED LINES
- PROPERTY LINE

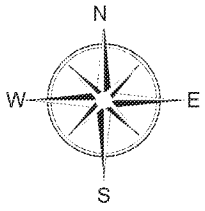
P/W PRODUCED Water

S/T = CRUDE Oil

BBL = BARRELS

GAL = GALLONS

*OVERFLOW, SCRUBBER HEATER TREATER CONTAIN CRUDE OIL AND PRODUCED WATER




Site Plan
EULA UTE 1-16A1
NWSE S16, T1S, R1W
LAT 40.39508 LONG -109.99796
DUCHESNE COUNTY, UT

Peakview Environmental LLC

EP ENERGY E & P COMPANY, LP | NOV 2017

# APPENDIX B

## Emission Calculations

# Oil Storage Tanks Flash Emissions - GOR Method
## Routed to to Flare
## EP Energy E&P Company L.P.
## Eula Ute 1-16A1

**Site Information**

| | | |
|---|---|---|
| Oil Production [1] | BOPD | 411 |
| VRU Operation **(NO VRU)** | | 0% |
| Molecular Weight of Flash Gas | lb/lb-mol | 50.95 |
| GOR[2] | scf/bbl | 30.03 |
| Flash Heat content | MMBtu/hr | 2875 |

| | |
|---|---|
| Hourly LP Flash Loss (scf/hr) [3] | 514.21 |
| Annual LP Flash Loss (MMscf/yr) [4] | 4.50 |
| Flash Emissions Heat Content (MMBtu/hr) | 1.48 |
| Flash Emissions Heat Content (MMBtu/yr) | 12,950 |

| Composition Data [2] | | | | | Uncontrolled Emissions | |
|---|---|---|---|---|---|---|
| Pollutant | LP Flash mol% | MW | Molar Wt lb/lb-mol gas | LP Flash Wt% | (lb/hr)[5] | (ton/yr) [6] |
| Oxygen | 0.000 | 32.00 | 0.00 | 0.000 | - | - |
| Carbon Dioxide | 0.577 | 44.01 | 0.25 | 0.498 | 0.35 | 1.52 |
| Hydrogen Sulfide | 0.000 | 34.80 | 0.00 | 0.000 | - | - |
| Nitrogen | 2.472 | 28.01 | 0.69 | 1.359 | 0.95 | 4.16 |
| Methane | 15.558 | 16.04 | 2.50 | 4.898 | 3.42 | 14.99 |
| Ethane | 10.432 | 30.07 | 3.14 | 6.157 | 4.30 | 18.84 |
| Propane | 23.739 | 44.10 | 10.47 | 20.547 | 14.36 | 62.87 |
| Iso-Butane | 4.562 | 58.12 | 2.65 | 5.204 | 3.64 | 15.92 |
| Butanes | 16.622 | 58.12 | 9.66 | 18.961 | 13.25 | 58.02 |
| iso-Pentane | 5.218 | 72.15 | 3.76 | 7.389 | 5.16 | 22.61 |
| Pentanes | 10.688 | 72.15 | 7.71 | 15.135 | 10.57 | 46.31 |
| n-Hexane | 3.005 | 86.16 | 2.59 | 5.081 | 3.55 | 15.55 |
| Other Hexanes | 1.699 | 86.16 | 1.46 | 2.873 | 2.01 | 8.79 |
| Heptanes + | 4.672 | 100.20 | 4.68 | 9.189 | 6.42 | 28.12 |
| Benzene | 0.664 | 78.11 | 0.52 | 1.018 | 0.71 | 3.12 |
| Toluene | 0.395 | 92.13 | 0.36 | 0.715 | 0.50 | 2.19 |
| Ethylbenzene | 0.081 | 106.17 | 0.09 | 0.168 | 0.12 | 0.51 |
| Xylenes | 0.323 | 106.17 | 0.34 | 0.674 | 0.47 | 2.06 |
| 2,2,4-Trimethylpentane | 0.060 | 114.23 | 0.07 | 0.134 | 0.09 | 0.41 |
| Total Volatile Organic Compounds | 71.73 | | | 87.09 | **60.84** | **266.49** |
| Total HAPs | | | | | **5.44** | **23.84** |
| Totals | 100.77 | | 50.95 | 100.0 | | |

**Uncontrolled**

| GHG | GWP | Emission Factor | | Emissions | |
|---|---|---|---|---|---|
| | | Wt% | Source | tons/yr | $CO_2e$[7] |
| $CO_2$ | 1 | 0.5 | [7] | 2 | 2 |
| $CH_4$ | 25 | 4.9 | [7] | 15 | 375 |
| **Total** | | - | - | - | **376** |

[1] Daily production = 102,200 bbls/yr /365 = 280 BOPD

[2] From Precision Analysis Lab Id 16060602-01,6/22/16 Gas Evolved from Flashed Hydrocarbon From 83 psig and 155F to 80F to 14.73 psi and 60F

[3] Hourly Flash Loss (scfh) = GOR (scf/bbl) x Throughput (bbl/day) / 24 (hr/day)

[4] Yearly Flash Loss (MMscf/yr) = Hourly Flash Loss (scfh) x 8760 (hr/yr) / $10^6$

[5] Uncontrolled Emissions (lb/hr) = Hourly Flash Loss (scf/hr) x Mol% x MW (lb/lb·mol) / 375 (scf/lb·mol)

[6] Uncontrolled Emissions (ton/yr) = Hourly Flash Loss (scfhr) x Mol% x MW (lb/lb-mol) / 375 (scf/gas/lb-mol) *8760 hrs/yr*1 ton/2000 lb

[7] Total GHG in $CO_2e$ (tpy) calculated using Global Warming Potential from 40 CFR 98 Subpart A, Table A-1

# Oil Storage Tanks Working and Standing Emissions
# Routed to Flare
# EP Energy E&P Company L.P.
# Eula Ute 1-16A1

**Site Information**

| | | |
|---|---|---|
| Oil Production [1] | bbls/year | 150,000 |
| Oil Production | gals/year | 6,300,000 |
| VRU Operation **(NO VRU)** | | - |
| Molecular Weight of W&S gas [4] | lb/lb-mol | 69.0 |
| Reid Vapor Pressure [2] | | 6.14 |
| W&S Emissions Heat Content [3] | MMBtu/scf | 0.0 |
| Total Site Annual W&S Losses [4] | lb/yr | 12,072.0 |
| Total Hourly Losses [5] | lb/hr | 1.38 |
| Total Annual Losses [6] | ton/yr | 6.04 |

| | |
|---|---|
| Vapor Density (lb/cu.ft) [4] | 0.01 |
| Hourly W&S loss (scf/hr) [7] | 100.9 |
| Annual W&S loss (MMscf/yr) [7] | 3.8 |
| Heat Content (MMBtu/hr) | 0.2 |
| Heat Content (MMBtu/yr) | 0.0 |

| Composition Data [3] | | Uncontrolled Emissions | |
|---|---|---|---|
| Pollutant | Stable Oil Vapor Wt% | (lb/hr) [8] | (ton/yr) [9] |
| Oxygen | 0.000 | - | - |
| Carbon Dioxide | 0.000 | - | - |
| Hydrogen Sulfide | 0.000 | - | - |
| Nitrogen | 0.104 | 0.00 | 0.01 |
| Methane | 5.155 | 0.07 | 0.31 |
| Ethane | 21.520 | 0.30 | 1.30 |
| Propane | 33.286 | 0.46 | 2.01 |
| Iso-Butane | 7.911 | 0.11 | 0.48 |
| Butanes | 19.887 | 0.27 | 1.20 |
| iso-Pentane | 3.683 | 0.05 | 0.22 |
| Pentanes | 3.057 | 0.04 | 0.18 |
| n-Hexane | 1.077 | 0.01 | 0.07 |
| Other Hexanes | 1.788 | 0.02 | 0.11 |
| Heptanes + | 1.921 | 0.03 | 0.12 |
| Benzene | 0.156 | 0.00 | 0.01 |
| Toluene | 0.124 | 0.00 | 0.01 |
| Ethylbenzene | 0.077 | 0.00 | 0.00 |
| Xylenes [11] | 0.119 | 0.00 | 0.01 |
| 2,2,4-Trimethylpentane | 0.134 | 0.00 | 0.01 |
| Total Volatile Organic Compounds | 73.2207 | **1.01** | **4.42** |
| Total HAPs | | **0.02** | **0.10** |
| Totals | 100.000 | | |

**Uncontrolled**

| GHG | GWP | Emission Factor | | Emissions | |
|---|---|---|---|---|---|
| | | Wt% | Source | tons/yr | $CO_2e$ [11] |
| $CO_2$ | 1 | 0.0 | [10] | 0 | 0 |
| $CH_4$ | 25 | 5.2 | [10] | 0 | 8 |
| **Total** | | - | - | - | **8** |

[1] Annual production = bbls yr /# tanks

[2] From Precision Analysis Lab Id 16060602-1 6/22/16 Gas Evolved from Flashed Hydrocarbon

[3] From Promax stock tank emissions composition

[4] From TANKS v.4.09d Output Report

[5] Total Hourly Losses = Total Annual Losses (lb/yr)/8760 hrs/yr

[6] Total Annual Losses (ton/yr) = Total annual losses (lb/yr)/2000 lb/ton

[7] Tank emission volumetric flow rates are obtained by dividing total emissions by the vapor density

[8] lb/hr emissions = Total working and standing losses (lb/hr)* stable oil vapor wt%/100

[9] ton/yr emissions = Total working and standing losses (ton/yr)* stable oil vapor wt%/100

[10] Stable oil vapor wt%

[11] Total GHG in CO2e (tpy) calculated using Global Warming Potential from 40 CFR 98 Subpart A, Table A-1

# Heater Emissions
# EP Energy E&P Company L.P.
# Eula Ute 1-16A1

**Site Information**

| | | |
|---|---|---|
| Heater Rating[1] | MMBtu/hr | 7.5 |
| Annual Hours of Operation | hr/yr | 8,760 |
| Fuel Heating Value[2] | Btu/scf | 1,200 |
| Fuel Sulfur Content[3] | grain/scf | 5,788 |

| Pollutant | Emission Factor | | Emissions[5] | |
|---|---|---|---|---|
| | EF (lb/$10^6$SCF) | AP-42 Source[4] | lb/hr | tons/yr |
| NOx | 100 | Table 1.4-1 | 0.63 | 2.74 |
| CO | 84 | Table 1.4-1 | 0.53 | 2.30 |
| $SO_2$ | 0.17 | Table 1.4-2 | 1.1E-03 | 4.7E-03 |
| $PM_{10}$ | 7.6 | Table 1.4-2 | 0.05 | 0.21 |
| VOC | 5.5 | Table 1.4-2 | 0.03 | 0.15 |
| Benzene | 2.10E-03 | Table 1.4-3 | 1.31E-05 | 5.75E-05 |
| Hexane | 1.8 | Table 1.4-3 | 1.13E-02 | 4.93E-02 |
| Formaldehyde | 7.5E-02 | Table 1.4-3 | 4.69E-04 | 2.05E-03 |
| Toluene | 3.4E-03 | Table 1.4-3 | 2.13E-05 | 9.31E-05 |
| Total HAPs | | | 1.18E-02 | 5.15E-02 |

| GHG | GWP | Emission Factor | | Emissions | |
|---|---|---|---|---|---|
| | | EF (lb/$10^6$ scf) | Source | tons/yr | $CO_2e$[6] |
| $CO_2$ | 1 | 1.20E+05 | Table 1.4-2 | 3,285 | 3,285 |
| $CH_4$ | 25 | 2.3 | Table 1.4-2 | 0.1 | 2 |
| $N_2O$ | 298 | 2.2 | Table 1.4-2 | 0.1 | 18 |
| **Total** | | - | - | - | **3,305** |

[1] Aggregate of all natural-gas fired heaters at the site

[2] Fuel heat content based on AP-42 pipeline spec

[3] AP-42 assumes a fuel sulfur content of 2000 grans/$10^6$; emission factor scaled by ration of actual sulfur content to 2,000 grains/$10^6$ scf. Fuel does not contain sulfur so assume MDL.

[4] Emission factors (EF) are from AP-42 Section 1.4

[5] Emissions; lb/hr = EF*heater rating (mmBTU/hr)/heat content of fuel(Btu/scf); tons/yr= emissions (lb/hr) * 8760 hrs/yr*1 ton/2000 lbs

[6]Total GHG in CO2e (tpy) calculated using Global Warming Potential from 40 CFR 98 Subpart A, Table A-1

# IC Engine Emissions
# EP Energy E&P Company L.P.
# Max's Place LLC 2-24B1

**Engine Data**

| | |
|---|---|
| Manufacturer | Portable Power |
| Model | NG200-01P |
| Serial Number | |
| Manufacture Date | After 2011 |
| Application | electric gen |
| Ignition/injection timing | Variable |
| Horsepower | 300 |
| Site Rated Horsepower | 300 |
| Fuel Consumption (Btu/hp-hr) | 7,404 |
| Hours of operation per year | 8760 |
| Engine Type | 4 Stroke Lean- |

**Fuel Data**

| | |
|---|---|
| Fuel Heat Content [2] (Btu/scf) | 1,200 |
| Fuel Sulfur Content[3] (grain/scf) | 5788.0 |
| Annual Consumption (MMScf/yr) | 16.2 |
| Hourly Consumption (MMscf/hr) | 0.0019 |
| Hourly Consumption (MMBtu/hr) | 2.22 |

**Method of Emission Control**

| | |
|---|---|
| NSCR Catalyst | No |
| SCR Catalyst | No |
| JLCC Catalyst | No |
| Parameter Adjustment | No |
| Stratified Charge | No |
| Other(Specify) | AFRC |
| Lean Burn | Yes |

**Federal Standards**

| | |
|---|---|
| NSPS Subpart JJJJ | Yes |
| MACT Subpart ZZZZ | Yes |

**Exhaust Parameters**

| | |
|---|---|
| Stack Height (ft) | 15 |
| Stack Diameter (ft) | 0.5 |
| Exit Velocity (fps) | 105.8 |
| Stack Temperature (°F) | 1350 |
| scf/hr | 74820 |

| | | EF AP-42 | | | Uncontrolled Emissions[3] | | Controls | | Controlled Emissions[5] | | Form 11 Engine Information | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contaminant | Test results or manufac-turer's EF before control (g/hp-hr) | Table 3.2-2 4 stroke, lean-burn engine emission factors (lb/mmBtu) | Emission Factor Used | Units | Emissions (lb/hr) | Emissions (tpy) | Efficiency of Control Device ( %) | Control Emission factor[4] (g/hp-hr) | Emissions (lb/hr) | Emissions (tpy) | MW[11] | ppmv[8] (20%) | ppmv[9] (15%) | Conc[10] (vol %) |
| VOC | 0.70 | 0.118 | 0.70 | g/hp-hr | **0.46** | **2.03** | | | **0.46** | **2.03** | 44.10 | 53.97 | 353.82 | 0.04 |
| NOx | 1.0 | 4.08 | 1.0 | g/hp-hr | **0.66** | **2.89** | | | **0.66** | **2.89** | 33.2 | 102.42 | 671.40 | 0.07 |
| CO | 2.0 | 0.317 | 2.0 | g/hp-hr | **1.32** | **5.79** | | | **1.32** | **5.79** | 28.00 | 242.87 | 1592.17 | 0.16 |
| PM10 [1] | | 0.0099871 | 0.0100 | lb/mmBtu | **0.02** | **0.10** | | | **0.02** | **0.10** | | | | |
| PM2.5[1] | | 0.0099871 | 0.0100 | lb/mmBtu | **0.02** | **0.10** | | | **0.02** | **0.10** | | | | |
| SO2 | | 0.000588 | 0.0006 | lb/mmBtu | **0.00** | **0.01** | | | **0.00** | **0.01** | 64.00 | 0.11 | 0.69 | 0.00 |
| Formaldehyde | | 0.0528 | 0.0528 | lb/mmBtu | **0.12** | **0.51** | | | **0.12** | **0.51** | 30.03 | 20.10 | 131.74 | 0.01 |
| Benzene | | 0.000404 | 0.0004 | lb/mmBtu | **0.00** | **0.00** | | | **0.00** | **0.00** | 78.11 | 0.06 | 0.39 | 0.00 |
| Acetaldehyde | | 0.00836 | 0.0084 | lb/mmBtu | **0.02** | **0.08** | | | **0.02** | **0.08** | 44.05 | 2.17 | 14.22 | 0.00 |
| Acrolein | | 0.00514 | 0.0051 | lb/mmBtu | **0.01** | **0.05** | | | **0.01** | **0.05** | 56.06 | 1.05 | 6.87 | 0.00 |
| Methanol | | 0.0025 | 0.0025 | lb/mmBtu | **0.01** | **0.02** | | | **0.01** | **0.02** | 32.04 | 0.89 | 5.85 | 0.00 |
| Total HAPS | | | | | **0.15** | **0.67** | | | **0.15** | **0.67** | | | | |

[1] $PM_{10}$ EF = $PM_{10}$ (filterable) + PM (Condensable); $PM_{2.5}$ EF = $PM_{2.5}$ (filterable) + PM (Condensable)

[2] AP-42 Pipeline quality gas spec

[3] Emissions (lb/hr)= EF(g/hp-hr)/454 g/lb*hp; or EF(g/mmBTU)*fuel consumption (Btu/hp-hr)*hp/1.0*10^6
Emissions (tpy) = emissions (lb/hr)*8760 hr/yr/2000 lb/ton

[4] Provided by manufacturer or field adjustment

[5] Controlled emissions are calculated using efficiency of control device(%) or controlled emission factor

| GHG | GWP | Emission Factor[6] | | CO2e Emissions | |
|---|---|---|---|---|---|
| | | kg/mmBTU | g/hp-hr | tpy | $CO_2e$[7] |
| $CO_2$ | 1 | 53.06 | 393 | 1,136 | 1,136 |
| $CH_4$ | 25 | 0.0010 | 0.010 | 0.02 | 1 |
| $N_2O$ | 298 | 0.0001 | 0 | 0.00 | 1 |
| **Total** | | - | - | - | **1,137** |

[6] Emission factors from 40 CFR 98, Subpart C, Table C-1 and C-2

[7] Total GHG in CO2e (tpy) calculated using Global Warming Potential from 40 CFR 98 Subpart A, Table A-1

[8] ppmv (20%) = lb/hr*1x10^6 *385 ft3/mw/vol flow rate ($ft^3$/hr)

[9] ppmV (15%) = ppmv(20%) *(20.9-15/20.9-20)

[10] 1% vol = 10,000 ppmv

[11] Assume mw of VOC = mw propane

# Loading Emissions- Routed to Flre
# EP Energy E&P Company L.P.
# Eula Ute 1-16A1

**Site Information**

| | | |
|---|---|---|
| Loading Rate | BOPD | 411 |
| | gal/day | 17260 |
| | gal/hr | 719 |
| True VP of Liquid Loaded (P)[1] | psia | 5 |
| MW of Vapor (M)[2] | lb/lb-mol | 41.94 |
| Temperature of liquid (T)[3] | °R | 619.67 |
| Saturation Factor (S)[4] | constant | 0.6 |
| Loading Losses[5] (L) | lb/1000 gal | 2.53 |
| Control Capture Efficiency | % | 70% |
| Control Efficiency | %` | 98% |

| Composition Data[2] | | Uncontrolled Emissions[6] | | Uncaptured Emissions[8] | | Controlled Emissions[9] | | Total Emissions[10] | |
|---|---|---|---|---|---|---|---|---|---|
| Pollutant | Stable Oil Vapor Wt% | (lb/hr) | (ton/yr) | (lb/hr) | (ton/yr) | (lb/hr) | (ton/yr) | (lb/hr) | (ton/yr) |
| Oxygen | 0.000 | - | - | - | - | - | - | - | - |
| Carbon Dioxide | 0.000 | - | - | - | - | - | - | - | - |
| Hydrogen Sulfide | 0.000 | - | - | - | - | - | - | - | - |
| Nitrogen | 0.104 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Methane | 5.155 | 0.09 | 0.41 | 0.03 | 0.12 | 0.00 | 0.00 | 0.03 | 0.13 |
| Ethane | 21.520 | 0.39 | 1.71 | 0.12 | 0.51 | 0.00 | 0.01 | 0.12 | 0.52 |
| Propane | 33.286 | 0.61 | 2.65 | 0.18 | 0.80 | 0.00 | 0.02 | 0.19 | 0.81 |
| Iso-Butane | 7.911 | 0.14 | 0.63 | 0.04 | 0.19 | 0.00 | 0.00 | 0.04 | 0.19 |
| Butanes | 19.887 | 0.36 | 1.58 | 0.11 | 0.48 | 0.00 | 0.01 | 0.11 | 0.48 |
| iso-Pentane | 3.683 | 0.07 | 0.29 | 0.02 | 0.09 | 0.00 | 0.00 | 0.02 | 0.09 |
| Pentanes | 3.057 | 0.06 | 0.24 | 0.02 | 0.07 | 0.00 | 0.00 | 0.02 | 0.07 |
| n-Hexane | 1.077 | 0.02 | 0.09 | 0.01 | 0.03 | 0.00 | 0.00 | 0.01 | 0.03 |
| Other Hexanes | 1.788 | 0.03 | 0.14 | 0.01 | 0.04 | 0.00 | 0.00 | 0.01 | 0.04 |
| Heptanes + | 1.921 | 0.03 | 0.15 | 0.01 | 0.05 | 0.00 | 0.00 | 0.01 | 0.05 |
| Benzene | 0.156 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.004 |
| Toluene | 0.124 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.003 |
| Ethylbenzene | 0.077 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.002 |
| Xylenes | 0.119 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.003 |
| 2,2,4-Trimethylpentane | 0.134 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.003 |
| Total VOCs | 73.22 | 1.33 | 5.84 | 0.40 | 1.75 | 0.01 | 0.04 | 0.41 | 1.79 |
| Total HAPs | | 0.03 | 0.13 | 0.01 | 0.04 | 0.00 | 0.00 | 0.01 | 0.04 |
| Totals | 100.000 | | | | | | | | |

| | | | | Uncontrolled | | Controlled | |
|---|---|---|---|---|---|---|---|
| GHG | GWP | Emission Factor | | Emissions | | | |
| | | Wt% | Source | tons/yr | $CO_2e^7$ | tons/yr | $CO_2e^7$ |
| $CO_2$ | 1 | 0 | NA | 0 | 0 | 0 | 0 |
| $CH_4$ | 25 | 5.2 | NA | 0.4 | 10 | 0.1 | 3 |
| **Total** | | - | - | - | **10** | **0** | **3** |

[1] From AP-42, Figure 7.1-13

[2] MW and composition based on Promax output

[3] Temperature of liquids loaded = 160° F

[4] From AP-42, Table 5.2-1, submerged loading

[5] From AP-42, Section 5.2, equation 1; L=12.46*SPM/T

[6] Emissions lb/hr = L (lb/1000 gal)*Loading rate (gal/hr)/1000 gal*wt%/100
Emissions ton/yr = emissions (lb/hr)*8760/2000

[7] $CO_2e$ based on Global Warming Potentials from Table A-1 of 40 CFR Part 98

[8] Uncaptured emissions = uncontrolled emissions * (1-capture efficiency)

[9] Controlled Emissions = uncontrolled loading * capture efficiency*(1-control efficiency)

[10] Total emissions = uncaptured emissions + controlled emissions

# Pneumatic Controller Emissions
# EP Energy E&P Company L.P.
# Eula Ute 1-16A1

**Site Information**

| | |
|---|---|
| Type of Controllers | Intermittent |
| Actuation Gas | Natural Gas |
| # of Controllers | 4 |
| Average Hours per Controller | 196 |
| EF[1] (VOC tons/hr) | 7.97E-05 |

[1] From UDAQ 2014 UBEI Workbook, Pneumatic Controller Tab, Intermittent Controller VOC Emission Factor

**Equation**

VOC Emissions (tpy) = # controllers*avg operating hour per controller * EF

= **0.06**

# Fugitive Emissions
# EP Energy E&P Company L.P.
# Eula Ute 1-16A1

## Equations[1]

$E_{gas} = \Sigma i \Sigma j\ Q_{fug,i,j}\ x\ n_i\ x\ t_{annual}$

$E_c = f_c\ x\ E_{gas}$

## Site Information

Qfug,i,j=Measured/estimated futgitive emissions rate of gas from component (i) in servuce (j) )(lb gas/ component-hr)

| | | | |
|---|---|---|---|
| Service Type = | Flash Gas[2] | | |
| Conversion factor (scf/lb-mol) = | 379.48 | $f_{nH}$ = mass fraction of n-hexane = | 5.08 |
| MW=molecular weight (lb/lb-mol) = | 50.95 | $f_{Bz}$ = mass fraction of benzene = | 1.02 |
| $f_{voc}$=VOC mass fraction = | 87.09 | $f_{Tl}$ = mass fraction of toluene = | 0.72 |
| $f_{co2}$= mass fraction CO2 | 0.5 | $f_{Eb}$ = mass fraction of ethylbenzene = | 0.17 |
| $f_{CH4}$= ass fraction CH4 | 4.9 | $f_{Xy}$ = mass fraction of xylene = | 0.67 |
| $t_{annual}$ = annual usage for component | 8760 | $f_{tmp}$ = mass fraction of 2,2,4-TMP = | 0.13 |

Component Count - Light Oil Service[3]

| Equipment | Number | Valves | Flanges | Connectors | OE Lines | Pump Seals | Other |
|---|---|---|---|---|---|---|---|
| Wells | 1 | 5 | 10 | 4 | 0 | 0 | 1 |
| Separator | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Heater Treater | 1 | 8 | 12 | 20 | 0 | 0 | 0 |
| Header | 1 | 5 | 10 | 4 | 0 | 0 | 0 |
| Total Components | | 18 | 32 | 28 | 0 | 0 | 1 |

## Light Oil (>20o) Fugitive Emissions

| | Valves | Flanges | Connectors | OE Lines | Pump Seals | Other | Total Emissions tons/yr | Total Emissions lbs/yr |
|---|---|---|---|---|---|---|---|---|
| **Total Emissions (ton/yr)** | | | | | | | | |
| EF= scf/component-hr[1] | 0.05 | 0.003 | 0.007 | 0.05 | 0.01 | 0.30 | | |
| lb/component-hr | 6.71E-03 | 4.03E-04 | 9.40E-04 | 6.71E-03 | 1.34E-03 | 4.03E-02 | | |
| Total Emissions (ton/yr)6 | 5.29E-01 | 5.65E-02 | 1.15E-01 | 0.00E+00 | 0.00E+00 | 1.76E-01 | **0.88** | |
| **GHG Emissions** | | | | | | | | |
| $CO_2$ (ton/yr) | 2.65E-03 | 2.82E-04 | 5.76E-04 | 0.00E+00 | 0.00E+00 | 8.82E-04 | 4.39E-03 | 8.77 |
| $CH_4$ (ton/yr) | 2.59E-02 | 2.77E-03 | 5.65E-03 | 0.00E+00 | 0.00E+00 | 8.64E-03 | 4.30E-02 | 85.99 |
| GHG $CO_2e$ | | | | | | | **9.98E-02** | **219.37** |
| **VOC Emissions** | | | | | | | | |
| VOC (ton/yr) | 4.61E-01 | 4.92E-02 | 1.00E-01 | 0.00E+00 | 0.00E+00 | 1.54E-01 | **0.76** | **1528.26** |
| **HAP Emissions** | | | | | | | | |
| n-hexane (ton/yr) | 2.69E-02 | 2.87E-03 | 5.86E-03 | 0.00E+00 | 0.00E+00 | 8.96E-03 | 4.46E-02 | 89.14 |
| benzene (ton/yr) | 5.40E-03 | 5.76E-04 | 1.18E-03 | 0.00E+00 | 0.00E+00 | 1.80E-03 | 8.95E-03 | 17.90 |
| toluene (ton/yr) | 3.81E-03 | 4.06E-04 | 8.30E-04 | 0.00E+00 | 0.00E+00 | 1.27E-03 | 6.32E-03 | 12.63 |
| ethylbenzene (ton/yr) | 8.89E-04 | 9.48E-05 | 1.94E-04 | 0.00E+00 | 0.00E+00 | 2.96E-04 | 1.47E-03 | 2.95 |
| xylene (ton/yr) | 3.55E-03 | 3.78E-04 | 7.72E-04 | 0.00E+00 | 0.00E+00 | 1.18E-03 | 5.88E-03 | 11.76 |
| 2,24-TMP (ton/yr) | 7.09E-04 | 7.56E-05 | 1.54E-04 | 0.00E+00 | 0.00E+00 | 2.36E-04 | 1.18E-03 | 2.35 |
| Total HAPs | | | | | | | **0.07** | **136.73** |

[1] Equations and emission factors based on 40 CFR Part 98 Subpart W

[2] Composition based on hydrocarbon analysis of site-specific oil and gas samples

[3] Componenet counts based on default values from 40 CFR Part 98 Subpart W; Table W-1C

[4] $CO_2e$ based on Global Warming Potentials from Table A-1 of 40 CFR Part 98

[5] Total GHG in $CO_2e$ (tpy) calculated using Global Warming Potential from 40 CFR 98 Subpart A, Table A-1

# Flare Emissions
# EP Energy E&P Company L.P.
# Eula Ute 1-16A1

**Site Information**

| | | |
|---|---|---|
| Heat Rating[1] | mmBtu/hr | 7.7 |
| Annual Hours of Operation | hr/yr | 8,760 |
| Fuel Heating Content[2] | Btu/scf | 2,875 |
| Fuel Sulfur Content[2] | grain/scf | 0.0 |
| Destruction Efficiency | % | 98.0 |

| Pollutant | Emission Factor | | Emissions[5] | |
|---|---|---|---|---|
| | EF (lb/MMBtu) | Source | lb/hr | tons/yr |
| $NO_2$ | 0.068 | AP-42 Table 13.5-1 | 0.52 | 2.29 |
| CO | 0.310 | AP-42 Table 13.5-2 | 2.39 | 10.46 |
| $SO_2$ | 2.89E-04 | [3] | 2.23E-03 | 0.01 |
| $PM_{10}$ | 0.000 | AP-42 Table 13.5-1 | 0.00 | 0.00 |
| VOC | 98% destruction[6] | NA | 1.24 | 5.42 |
| $CH_4$ | 98% destruction[6] | NA | 0.07 | 0.31 |
| n-Hexane | 98% destruction[6] | NA | 0.07 | 0.31 |
| Benzene | 98% destruction[6] | NA | 0.01 | 0.06 |
| Toluene | 98% destruction[6] | NA | 0.00 | 0.04 |
| Xylenes | 98% destruction[6] | NA | 0.01 | 0.04 |
| Ethylbenzene | 98% destruction[6] | NA | 0.00 | 0.01 |
| 2,2,4-Trimethylpentane | 98% destruction[6] | NA | 0.00 | 0.01 |
| Total HAP | 98% destruction[6] | NA | 0.11 | 0.48 |

| GHG | GWP | Emission Factor | | Emissions | |
|---|---|---|---|---|---|
| | | EF (kg/MMBtu) | Source | tons/yr | $CO_2e$[6] |
| $CO_2$ | 1 | 53.020 | 40 CFR 98-C | 3,934 | 3,934 |
| $CH_4$ | 25 | [4] | [4] | 0.31 | 8 |
| $N_2O$ | 298 | 0.0001 | 40 CFR 98-C | 0.007 | 2 |
| **Total** | | - | - | - | **3,944** |

[1] Maximum rating of flare ; equipment specifications
[2] From Precision Analysis Lab Id 16060602--01,6/22/16 Gas Evolved from Flashed Hydrocarbon From 83 psig and
[3] MDL for $H_2S$; assumed to be 100% conversion from $H_2S$ to $SO_2$
[4] Actual wt% in fuel stream *(1-.98)
[5] Emissions (lb/hr) = EF*7.7 mmBTU/hr; Emissions (tons/yr)= emissions (lb/hr) * 8760 hrs/yr*1 ton/2000 lbs
[6] Total GHG in CO2e (tpy) calculated using Global Warming Potential from 40 CFR 98 Subpart A, Table A-1

Values for Form 4 - Flare Systems

| Form 4 | Value Used | Reference |
|---|---|---|
| Min flowrate Expected (scfm) | 4.69 | Tank losses (scfm) @ 50% of max production rate |
| Ave flowrate Expected (scfm) | 8.15 | Tank losses (scfm) @ 75% of max production rate |
| Min Expected (MMBtu/hr) | 0.97 | Tank losses (mmBtu/hr) @ 50% of max production rate |
| Design Max (MMBtu/hr | 7.7 | From manufacturer |
| Heat Content | 2875 | Heat content of flash losses |
| Pressure | 0.03 | From manufacturer |

# Criteria Pollutants Emissions Summary
# EP Energy E&P Company L.P.
# Eula Ute 1-16A1

**Uncontrolled PTE**

| Pollutant (TPY) | VOC | CO | $NO_X$ | $SO_2$ | PM | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|---|
| Oil Storage Tanks | 270.91 | - | - | - | - | - | - |
| Truck Loading | 5.84 | - | - | - | - | - | - |
| Methanol Storage Tank | - | - | - | - | - | - | - |
| Heaters (≤7.5 MMBtu/hr total) | 0.15 | 2.30 | 2.74 | 0.00 | 0.42 | 0.21 | 0.21 |
| Natural Gas Fired Gen Engine | 2.03 | 5.79 | 2.89 | 0.01 | 0.19 | 0.10 | 0.10 |
| Pneumatic Controllers | 0.06 | - | - | - | - | - | - |
| Fugitives | 0.76 | - | - | - | - | - | - |
| **Total** | **279.75** | **8.09** | **5.63** | **0.01** | **0.61** | **0.31** | **0.31** |

**Controlled PTE**

| Pollutant (TPY) | VOC | CO | $NO_X$ | $SO_2$ | PM | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|---|
| Oil Storage Tanks | *Routed to Flare* | | | | | | |
| Truck Loading | 1.79 | - | - | - | | - | - |
| Methanol Storage Tank | - | - | - | - | | - | - |
| Heaters (≤7.5 MMBtu/hr total) | 0.15 | 2.30 | 2.74 | 0.00 | 0.42 | 0.21 | 0.21 |
| Natural Gas Fired Gen Engine | 2.03 | 5.79 | 2.89 | 0.01 | 0.19 | 0.10 | 0.10 |
| Pneumatic Controllers | 0.06 | - | - | - | - | - | - |
| Fugitives | 0.76 | - | - | - | - | - | - |
| Flare | 5.42 | 10.46 | 2.29 | 0.01 | 0.00 | 0.00 | 0.00 |
| **Total** | **10.21** | **18.54** | **7.93** | **0.02** | **0.61** | **0.31** | **0.31** |

# HAPs Emissions Summary
# EP Energy E&P Company L.P.
# Eula Ute 1-16A1

## Uncontrolled PTE (TPY)

| Pollutant (TPY) | n-Hexane | Benzene | Toluene | e-benzene | Xylenes | 2,2,4-TMP | Formaldehyde | Acetaldehyde | Acrolein | Methanol | Total HAPs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Oil Storage Tanks | 15.61 | 3.12 | 2.20 | 0.52 | 2.07 | 0.42 | - | - | - | - | 23.94 |
| Truck Loading | 0.09 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | - | - | - | - | 0.13 |
| Methanol Storage Tank[1] | - | - | - | - | - | - | - | - | - | 0.03 | 0.03 |
| Heaters (≤7.5 MMBtu/hr total) | 0.05 | 0.00 | 0.00 | - | - | - | - | - | - | - | 0.05 |
| Natural Gas Fired Gen Engine | | 0.00 | - | - | - | - | 0.51 | 0.08 | 0.05 | 0.02 | 0.67 |
| Pneumatic Controllers | - | - | - | - | - | - | - | - | - | - | - |
| Fugitives | 0.04 | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | - | - | - | - | 0.07 |
| **Total** | **15.79** | **3.15** | **2.21** | **0.53** | **2.09** | **0.43** | **0.51** | **0.08** | **0.05** | **0.05** | **24.9** |

## Controlled PTE (TPY)

| Pollutant (TPY) | n-Hexane | Benzene | Toluene | e-benzene | Xylenes | 2,2,4-TMP | Formaldehyde | Acetaldehyde | Acrolein | Methanol | Total HAPs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Oil Storage Tanks | *Routed to Flare* | | | | | | | | | | |
| Truck Loading | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | 0.04 |
| Methanol Storage Tank | - | - | - | - | | - | - | - | - | 0.03 | 0.03 |
| Heaters (≤7.5 MMBtu/hr total) | 0.05 | 0.00 | 0.00 | - | - | - | - | - | - | - | 0.05 |
| Natural Gas Fired Gen Engine | - | 0.00 | - | - | - | - | 0.51 | 0.08 | 0.05 | 0.02 | 0.67 |
| Pneumatic Controllers | - | - | - | - | - | - | - | - | - | - | - |
| Fugitives | 0.04 | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | - | - | - | - | 0.07 |
| Flare | 0.31 | 0.06 | 0.04 | 0.01 | 0.04 | 0.01 | - | - | - | - | 0.48 |
| **Total** | **0.43** | **0.08** | **0.05** | **0.01** | **0.05** | **0.01** | **0.51** | **0.08** | **0.05** | **0.05** | **1.34** |

## HAPs Hourly Maximum Emission Rate

| Pollutant (lb/hr) | n-hexane | Benzene | Toluene | e-benzene | Xylenes | 2,2,4-TMP | Formaldehyde | Acetaldehyde | Acrolein | Methanol | Total HAPs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Oil Storage Tanks | *Routed to Flare* | | | | | | | | | | |
| Truck Loading | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | 0.04 |
| Heaters (≤7.5 MMBtu/hr total) | 0.01 | 0.00 | 0.00 | - | - | - | - | - | - | - | 0.01 |
| Natural Gas Fired Gen Engine | - | 0.00 | - | - | - | - | 0.12 | 0.02 | 0.01 | 0.01 | 0.15 |
| Fugitives | 0.04 | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | - | - | - | - | 0.07 |
| Fugitives | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | - | - | - | - | 0.02 |
| Flare | 0.07 | 0.01 | 0.00 | 0.00 | 0.01 | 0.00 | - | - | - | - | 0.10 |

# Laboratory Analytical Report and Promax Output

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# Flash Liberation of Hydrocarbon Liquid Study

| | | | |
|---|---|---|---|
| **Client:** | LT Environmental | **Sample Lab ID:** | 16060602-01 |
| **Site Name:** | Powell 2-13 A2 | **Analyst:** | AP |
| **Unique Number:** | Not Indicated | **Date Analyzed:** | 06/22/16 |
| **Date Sampled:** | 06/17/16 | | |
| **State:** | UT | **Site Notes:** | |
| **County:** | Duchesne | | |

## Flash Liberation of Hydrocarbon Liquid Conditions

| | Pressure (psig) | Temperature (°F) |
|---|---|---|
| Separator Hydrocarbon Liquid | 83.0 | 155.0 |
| Stock Tank | 80.0 | 160.0 |

## Base Conditions

| | Pressure (psi) | Temperature (°F) |
|---|---|---|
| Base Conditions | 14.73 | 60 |

## Flash Liberation of Hydrocarbon Liquid Results

| Parameter | Result | Units/Description |
|---|---|---|
| Gas Oil Ratio | 30.03 | SCF flashed vapor/bbl stock tank oil |
| Gas Specific Gravity | 1.770 | Air = 1.000 |
| Separator Volume Factor | 1.001 | Separator Volume/Stock tank Volume |

## Stock Tank Fluid Properties

| Parameter | Result | Units/Description |
|---|---|---|
| Shrinkage Recovery Factor | 0.999 | Fraction of first stage separator liquid |
| Oil API Gravity at 60 °F | 31.94 | |
| Oil API Gravity, observed | 33.44 | at 83°F |
| Reid Vapor Pressure, psi | 6.14 | Absolute Pressure at 100°F by D5191 |

## Quality Control Summary

| Duplicate Results | % Difference | Acceptable Range |
|---|---|---|
| Gas Oil Ratio | 3.3 | <5% |
| Separator Volume Factor | 0.003 | <5% |
| Shrinkage Recovery Factor | 0.003 | <5% |
| Cylinder Type | Liquid Displacement | |
| Sample Collection Rate (mL/min) | 50 | <60 |

## Cylinder Pressure Check

| | Pressure (psi) | Temperature (°F) |
|---|---|---|
| Sample Conditions | 83.0 | 155.0 |
| Test Sample | 30.0 | 150.0 |

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# Gas Evolved from Flashed Hydrocarbon Liquid

**Run File:** C:\Galaxie\data\16_06_22\16060602-011.DATA
**Method:** S2_ExtBTEX

| | | | |
|---|---|---|---|
| **Operator** | AP | **Analysis Date** | 6/22/2016 |
| **Client:** | LT Environmental | **Date Sampled:** | 6/22/2016 |
| **Site Name:** | Powell 2-13 A2 | **Purpose:** | Flash Gas Analysis |
| **Unique #:** | Not Indicated | **Pressure:** | Ambient |
| **Sample Temperature:** | 70°F | **Type Sample:** | Spot |
| **Sampled by:** | AP | **County:** | Duchesne |

| COMPONENT | MOLE % | GPM |
|---|---|---|
| Hydrogen Sulfide | 0.000 | 0.000 |
| Nitrogen (N2) | 2.472 | |
| Carbon Dioxide | 0.577 | |
| Methane (CH4) | 15.557 | |
| Ethane (C2) | 10.432 | 2.783 |
| Propane (C3) | 23.740 | 6.524 |
| iso-Butane (i-C4) | 4.562 | 1.489 |
| Butane (C4) | 16.620 | 5.226 |
| iso-Pentane (i-C5) | 5.218 | 1.903 |
| Pentane (C5) | 7.472 | 2.702 |
| Hexanes | 7.054 | 0.676 |
| Heptanes Plus | 6.297 | 4.768 |
| Totals | 100.000 | 26.070 |

| | |
|---|---|
| Specific Gravity | 1.770 |
| Compressibility (Z) | 0.9732 |
| Molecular Weight | 50.95 |

| | | | |
|---|---|---|---|
| Saturated Ideal BTUs | 2749.1 | Saturated Real BTUs | 2824.8 |
| Dry Ideal BTUs | 2797.8 | Dry Real BTUs | 2874.9 |

Base Conditions: 14.73 psi 60 °F

# Gas Evolved from Flashed Hydrocarbon Liquid
# Extended Analysis Report

| COMPONENT | MOLE % | BTU | GPM | WT % |
|---|---|---|---|---|
| Hydrogen Sulfide | 0.000 | 0.000 | 0.000 | 0.000 |
| Nitrogen (N2) | 2.472 | | | 1.359 |
| Carbon Dioxide | 0.577 | | | 0.498 |
| Methane (CH4) | 15.557 | 157.486 | | 4.898 |
| Ethane (C2) | 10.432 | 185.042 | 2.783 | 6.157 |
| Propane (C3) | 23.740 | 598.701 | 6.524 | 20.547 |
| iso-Butane (i-C4) | 4.562 | 148.691 | 1.489 | 5.204 |
| Butane (C4) | 16.620 | 543.458 | 5.226 | 18.961 |
| iso-Pentane (i-C5) | 5.218 | 209.255 | 1.903 | 7.389 |
| Pentane (C5) | 7.472 | 300.227 | 2.702 | 10.581 |
| 2,2-Dimethylbutane | 0.229 | 8.057 | 0.068 | 0.315 |
| Cyclopentane | 1.717 | 60.427 | 0.507 | 2.363 |
| 2,3-Dimethylbutane | 0.343 | 12.085 | 0.101 | 0.473 |
| 2-Methylpentane | 0.522 | 23.011 | 0.213 | 0.883 |
| 3-Methylpentane | 0.308 | 13.549 | 0.125 | 0.520 |
| n-Hexane | 3.004 | 143.192 | 1.232 | 5.081 |
| Methylcyclopentane | 0.679 | 37.424 | 0.312 | 1.335 |
| Benzene | 0.664 | 23.887 | 0.185 | 1.018 |
| Cyclohexane | 0.579 | 24.271 | 0.197 | 0.957 |
| 2-Methylhexane | 0.145 | 6.068 | 0.049 | 0.239 |
| 3-Methylhexane | 0.207 | 8.668 | 0.070 | 0.342 |
| 2,2,4-Trimethylpentane | 0.060 | 3.459 | 0.031 | 0.134 |
| Other Heptanes (C7's) | 1.131 | 62.373 | 0.520 | 2.224 |
| n-Heptane | 0.452 | 24.949 | 0.208 | 0.890 |
| Methylcyclohexane | 0.537 | 26.199 | 0.215 | 1.036 |
| Toluene | 0.395 | 16.936 | 0.132 | 0.715 |
| Other Octanes (C8's) | 0.386 | 24.184 | 0.197 | 0.866 |
| n-Octane | 0.208 | 13.022 | 0.106 | 0.466 |
| Ethylbenzene | 0.080 | 4.006 | 0.031 | 0.168 |
| m,p-Xylene | 0.270 | 13.429 | 0.105 | 0.563 |
| o-Xylene | 0.053 | 2.638 | 0.021 | 0.111 |
| Other Nonanes (C9's) | 0.350 | 24.575 | 0.197 | 0.882 |
| n-Nonane | 0.189 | 13.233 | 0.106 | 0.475 |
| Other Decanes (C10's) | 0.589 | 45.723 | 0.361 | 1.645 |
| n-Decane | 0.168 | 13.064 | 0.103 | 0.470 |
| Undecanes (C11) | 0.084 | 6.532 | 0.052 | 0.235 |
| Totals | 100.000 | 2797.8 | 26.070 | 100.000 |

| | | | |
|---|---|---|---|
| Specific Gravity | 1.770 | | |
| Compressibility (Z) | 0.973 | | |
| Molecular Weight | 50.948 | | |
| Saturated Ideal BTUs | 2749.1 | Saturated Real BTUs | 2824.8 |
| Dry Ideal BTUs | 2797.8 | Dry Real BTUs | 2874.9 |
| Base Conditions: | 14.73 psi | 60 °F | |

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# EXTENDED HYDROCARBON LIQUID STUDY
# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| Company: | **LT Environmental** | Sample Name: | **Powell 2-13 A2 Pressurized Liquid** |
| Sample Date: | 6/17/2016 | Sample Number: | 16060602-01 |
| Sample Facility: | Not Indicated | Date Tested: | 6/22/2016 |
| Sample Equipment: | Treater Vessle | Test Method: | GPA 2186M |
| Sample Location: | Duchesne | Date Reported: | 6/22/2016 |
| Sample Pressure: | 81 PSIG | | |
| Sample Temperature: | 155°F | | |
| Sampling Method: | GPA-2174 | | |
| Type Sample: | Spot | | |

| Components | Mole % | Weight % | Liq. Vol. % |
|---|---|---|---|
| Carbon Dioxide | 0.000 | 0.000 | 0.000 |
| Nitrogen | 0.047 | 0.006 | 0.006 |
| Methane | 1.387 | 0.108 | 0.275 |
| Ethane | 0.901 | 0.132 | 0.282 |
| Propane | 1.657 | 0.355 | 0.534 |
| iso-Butane | 0.598 | 0.169 | 0.229 |
| n-Butane | 1.980 | 0.592 | 0.768 |
| iso-Pentane | 0.659 | 0.231 | 0.282 |
| n-Pentane | 0.698 | 0.245 | 0.296 |
| 2-Methylpentane | 0.543 | 0.227 | 0.265 |
| 3-Methylpentane | 0.217 | 0.091 | 0.106 |
| Heptanes | 1.432 | 0.698 | 0.785 |
| Octanes | 2.321 | 1.289 | 1.407 |
| Nonanes | 1.527 | 0.937 | 0.912 |
| Decanes+ | 83.864 | 93.890 | 92.868 |
| Benzene | 0.144 | 0.055 | 0.047 |
| Toluene | 0.286 | 0.128 | 0.112 |
| Ethylbenzene | 0.392 | 0.203 | 0.177 |
| m-Xylene | 0.388 | 0.201 | 0.176 |
| p-Xylene | 0.063 | 0.032 | 0.028 |
| o-Xylene | 0.146 | 0.076 | 0.065 |
| n-Hexane | 0.595 | 0.249 | 0.286 |
| 2,2,4-Trimethylpentane | 0.155 | 0.086 | 0.094 |
| **Totals** | **100.000** | **100.000** | **100.000** |

## SAMPLE CHARACTERISTICS

| | |
|---|---|
| RELATIVE SPECIFIC GRAVITY, calculated | **0.76239** |
| API GRAVITY AT 60/60 F, calculated | **54.1** |
| TRUE VAPOR PRESSURE AT 100 F, PSIA, calculated | **83.856** |
| AVERAGE MOLECULAR WEIGHT | **205.670** |
| AVERAGE BOILING POINT, F, calculated | **477.926** |
| RELATIVE SPECIFIC GRAVITY OF DECANES+ (C10+) FRACTION, calculated | **0.76697** |
| AVERAGE MOLECULAR WEIGHT OF DECANES+ (C10+) FRACTION, calculated | **215.149** |
| BTU / GALLON OF LIQUID AT 14.73 PSIA, calculated | **59,364.49** |
| LBS / GALLON OF LIQUID, calculated | **6.356** |

NOTATION: ALL CALCULATIONS PERFORMED USING PHYSICAL CONSTANTS FROM GPA 2145-09, THE TABLES OF PHYSICAL CONSTANTS FOR HYDROCARBONS AND OTHER COMPOUNDS OF INTEREST TO THE NATURAL GAS INDUSTRY.

Powell 2-13A2K
ProMax Emissions Output

| Process Streams | Residual Oil | Working Breathing |
|---|---|---|
| Composition | | |
| Phase: Total | | |
| Stefan From Block: | - | - |
| To Block: | VRU_100 | - |
| Mole Fraction | % | % |
| Nitrogen | 0.047* | 0.153049* |
| Methane | 1.387* | 13.2531* |
| Ethane | 0.901* | 29.5124* |
| Propane | 1.657* | 31.1336* |
| i-Butane | 0.598* | 5.61379* |
| n-Butane | 1.98* | 14.1122* |
| i-Pentane | 0.659* | 2.10557* |
| n-Pentane | 0.698* | 1.74756* |
| 2-Methylpentane | 0.543* | 0.628189* |
| 3-Methylpentane | 0.217* | 0.227722* |
| Heptane | 1.432* | 0.428482* |
| Octane | 2.321* | 0.243435* |
| Nonane | 1.527* | 0.0567254* |
| Benzene | 0.144* | 0.0824711* |
| Toluene | 0.286* | 0.0554282* |
| Ethylbenzene | 0.392* | 0.0298483* |
| m-Xylene | 0.388* | 0.0344221* |
| p-Xylene | 0.063* | 0.00427509* |
| o-Xylene | 0.146* | 0.00767785* |
| n-Hexane | 0.595* | 0.515504* |
| 2,2,4-Trimethylpentane | 0.155* | 0.0485079* |
| decane+ | 83.864* | 0.00601618* |
| Mass Fraction | % | % |
| Nitrogen | 0.00682324* | 0.103954* |
| Methane | 0.115312* | 5.15505* |
| Ethane | 0.140401* | 21.5163* |
| Propane | 0.378656* | 33.2865* |
| i-Butane | 0.180123* | 7.91119* |
| n-Butane | 0.596395* | 19.8876* |
| i-Pentane | 0.246400* | 3.68334* |
| n-Pentane | 0.260982* | 3.05706* |
| 2-Methylpentane | 0.242499* | 1.31255* |
| 3-Methylpentane | 0.0969103* | 0.475809* |
| Heptane | 0.743612* | 1.04100* |
| Octane | 1.37397* | 0.674221* |
| Nonane | 1.01494* | 0.176399* |
| Benzene | 0.0582916* | 0.156193* |
| Toluene | 0.136563* | 0.123827* |
| Ethylbenzene | 0.215672* | 0.0768323* |
| m-Xylene | 0.213472* | 0.0886058* |
| p-Xylene | 0.0346616* | 0.0110045* |
| o-Xylene | 0.0803269* | 0.0197635* |
| n-Hexane | 0.265722* | 1.07711* |
| 2,2,4-Trimethylpentane | 0.0917557* | 0.134348* |
| decane+ | 93.5065* | 0.0313837* |

| | | |
|---|---|---|
| CO2 | 0 | |
| Methane | 5.155* | 0.05155046 |
| | wt% | wt fraction |
| VOC | 73.225* | 0.73224669 |
| B | 0.156* | 0.00156193 |
| T | 0.124* | 0.00123827 |
| E | 0.077* | 0.00076832 |
| X | 0.119* | 0.00119374 |
| n-hex | 1.077* | 0.01077106 |
| 2,2,4 | 0.134* | 0.00134348 |

Powell 2-13A2K
ProMax Emissions Output

| Mass Flow | lb/h | lb/h |
|---|---|---|
| Nitrogen | 0.915517* | 0.00417860* |
| Methane | 15.4721* | 0.207216* |
| Ethane | 18.8385* | 0.864887* |
| Propane | 50.8067* | 1.33801* |
| i-Butane | 24.1683* | 0.318004* |
| n-Butane | 80.0221* | 0.799416* |
| i-Pentane | 33.0611* | 0.148058* |
| n-Pentane | 35.0177* | 0.122884* |
| 2-Methylpentane | 32.5376* | 0.0527604* |
| 3-Methylpentane | 13.0031* | 0.0191260* |
| Heptane | 99.7751* | 0.0418450* |
| Octane | 184.354* | 0.0271015* |
| Nonane | 136.181* | 0.00709066* |
| Benzene | 7.82136* | 0.00627846* |
| Toluene | 18.3236* | 0.00497744* |
| Ethylbenzene | 28.9381* | 0.00308841* |
| m-Xylene | 28.6428* | 0.00356167* |
| p-Xylene | 4.65077* | 0.000442346* |
| o-Xylene | 10.7780* | 0.000794431* |
| n-Hexane | 35.6536* | 0.0432962* |
| 2,2,4-Trimethylpentane | 12.3114* | 0.00540035* |
| decane+ | 12546.4* | 0.00126152* |

| Process Streams | | Residual Oil | Working Breathing |
|---|---|---|---|
| Properties | Stream | -- | -- |
| Phase: Total | From Block | -- | -- |
| | To Block | V&SL-tnk | -- |
| Property | Units | | |
| Temperature | °F | 155* | 124.242* |
| Pressure | psia | 14.6959* | 14.3998 |
| Mole Fraction Vapor | % | 3.37971 | 100* |
| Mole Fraction Light Liquid | % | 96.6203 | 0 |
| Mole Fraction Heavy Liquid | % | 0 | 0 |
| Molecular Weight | lb/lbmol | 192.963 | 41.2436 |
| Mass Density | lb/ft^3 | 9.99300 | 0.0958419 |
| Molar Flow | lbmol/h | 69.5349 | 0.0974619 |
| Mass Flow | lb/h | 13417.6 | 4.01968* |
| Vapor Volumetric Flow | ft^3/h | 1342.70 | 41.9407 |
| Liquid Volumetric Flow | gpm | 167.402 | 5.22897 |
| Std Vapor Volumetric Flow | MMSCFD | 0.633297 | 0.000887645 |
| Std Liquid Volumetric Flow | sgpm | 35.3839 | 0.0168744 |
| Compressibility | | 0.0430199 | 0.988887 |
| Specific Gravity | | | 1.42403 |
| API Gravity | | | |
| Enthalpy | Btu/h | -1.02556E+07 | -4205.73 |
| Mass Enthalpy | Btu/lb | -764.334 | -1046.29 |
| Mass Cp | Btu/(lb*°F) | 0.547772 | 0.438862 |
| Ideal Gas CpCv Ratio | | 1.02345 | 1.12397 |
| Dynamic Viscosity | cP | | 0.00928859 |
| Kinematic Viscosity | cSt | | 6.05025 |
| Thermal Conductivity | Btu/(h*ft*°F) | | 0.0130719 |
| Surface Tension | lbf/ft | | |
| Net Ideal Gas Heating Value | Btu/ft^3 | 9641.79 | 2167.61 |
| Net Liquid Heating Value | Btu/lb | 18810.5 | 19794.6 |
| Gross Ideal Gas Heating Value | Btu/ft^3 | 10315.7 | 2357.90 |
| Gross Liquid Heating Value | Btu/lb | 20135.9 | 21545.4 |

| | | |
|---|---|---|
| CO2 | 0 | |
| Methane | 0.207* | 0.908* |
| | | UNC |
| | lb/hr | tpy |
| VOC | 2.943* | 12.892* |
| B | 0.006* | 0.027* |
| T | 0.005* | 0.022* |
| E | 0.003* | 0.014* |
| X | 0.005* | 0.021* |
| n-hex | 0.043* | 0.190* |
| 2,2,4 | 0.005* | 0.024* |
| bbl/day | 1213.163717 | |

# TANKs 4.09d Emissions Report

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | 500 bbl Tank |
| City: | Salt Lake City |
| State: | Utah |
| Company: | EP Energy E&P Company LP |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | 150,000 BOPY 500 BBl tanks |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 20.00 |
| Diameter (ft): | 13.50 |
| Liquid Height (ft) : | 19.00 |
| Avg. Liquid Height (ft): | 16.00 |
| Volume (gallons): | 18,865.29 |
| Turnovers: | 166.97 |
| Net Throughput(gal/yr): | 3,150,000.00 |
| Is Tank Heated (y/n): | Y |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | Gray/Light |
| Shell Condition | Good |
| Roof Color/Shade: | Gray/Light |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Dome |
| Height (ft) | 2.00 |
| Radius (ft) (Dome Roof) | 13.50 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | 0.00 |
| Pressure Settings (psig) | 0.00 |

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**500 bbl Tank - Vertical Fixed Roof Tank**
**Salt Lake City, Utah**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gasoline (RVP 6) | All | 59.41 | 49.72 | 69.11 | 54.20 | 2.8989 | 2.3596 | 3.5346 | 69.0000 | | | 92.00 | Option 4: RVP=6, ASTM Slope=3 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Detail Calculations (AP-42)

**500 bbl Tank - Vertical Fixed Roof Tank**
**Salt Lake City, Utah**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 840.5420 |
| Vapor Space Volume (cu ft): | 719.8829 |
| Vapor Density (lb/cu ft): | 0.0359 |
| Vapor Space Expansion Factor: | 0.1579 |
| Vented Vapor Saturation Factor: | 0.5641 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 719.8829 |
| Tank Diameter (ft): | 13.5000 |
| Vapor Space Outage (ft): | 5.0293 |
| Tank Shell Height (ft): | 20.0000 |
| Average Liquid Height (ft): | 16.0000 |
| Roof Outage (ft): | 1.0293 |
| Roof Outage (Dome Roof) | |
| Roof Outage (ft): | 1.0293 |
| Dome Radius (ft): | 13.5000 |
| Shell Radius (ft): | 6.7500 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0359 |
| Vapor Molecular Weight (lb/lb-mole): | 69.0000 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 2.8989 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 519.0816 |
| Daily Average Ambient Temp. (deg. F): | 51.9625 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 513.8725 |
| Tank Paint Solar Absorptance (Shell): | 0.5400 |
| Tank Paint Solar Absorptance (Roof): | 0.5400 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,452.1184 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.1579 |
| Daily Vapor Temperature Range (deg. R): | 19.3870 |
| Daily Vapor Pressure Range (psia): | 1.1750 |
| Breather Vent Press. Setting Range(psia): | 0.0000 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 2.8989 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 2.3596 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 3.5346 |
| Daily Avg. Liquid Surface Temp. (deg R): | 519.0816 |
| Daily Min. Liquid Surface Temp. (deg R): | 509.3881 |
| Daily Max. Liquid Surface Temp. (deg R): | 528.7751 |
| Daily Ambient Temp. Range (deg. R): | 23.3583 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.5641 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 2.8989 |
| Vapor Space Outage (ft): | 5.0293 |
| Working Losses (lb): | 5,195.5802 |
| Vapor Molecular Weight (lb/lb-mole): | 69.0000 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 2.8989 |
| Annual Net Throughput (gal/yr.): | 3,150,000.0000 |
| Annual Turnovers: | 166.9734 |
| Turnover Factor: | 0.3463 |
| Maximum Liquid Volume (gal): | 18,865.2856 |
| Maximum Liquid Height (ft): | 19.0000 |
| Tank Diameter (ft): | 13.5000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 6,036.1322 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**500 bbl Tank - Vertical Fixed Roof Tank**
**Salt Lake City, Utah**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| Gasoline (RVP 6) | 5,195.59 | 840.54 | 6,036.13 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | 500 gal Methanol Tank |
| City: | Salt Lake City |
| State: | Utah |
| Company: | EP Energy |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 6.00 |
| Diameter (ft): | 4.00 |
| Liquid Height (ft) : | 6.00 |
| Avg. Liquid Height (ft): | 4.00 |
| Volume (gallons): | 564.02 |
| Turnovers: | 3.19 |
| Net Throughput(gal/yr): | 1,800.00 |
| Is Tank Heated (y/n): | Y |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | Gray/Light |
| Shell Condition | Good |
| Roof Color/Shade: | Gray/Light |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Dome |
| Height (ft) | 22.00 |
| Radius (ft) (Dome Roof) | 4.00 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | 0.00 |
| Pressure Settings (psig) | 0.00 |

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**500 gal Methanol Tank - Vertical Fixed Roof Tank**
**Salt Lake City, Utah**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Methyl alcohol | All | 59.41 | 49.72 | 69.11 | 54.20 | 1.4156 | 1.0351 | 1.9099 | 32.0400 | | | 32.04 | Option 2: A=7.897, B=1474.08, C=229.13 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Detail Calculations (AP-42)

**500 gal Methanol Tank - Vertical Fixed Roof Tank**
**Salt Lake City, Utah**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 55.7471 |
| Vapor Space Volume (cu ft): | 5,738.6426 |
| Vapor Density (lb/cu ft): | 0.0081 |
| Vapor Space Expansion Factor: | 0.1153 |
| Vented Vapor Saturation Factor: | 0.0284 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 5,738.6426 |
| Tank Diameter (ft): | 4.0000 |
| Vapor Space Outage (ft): | 456.6667 |
| Tank Shell Height (ft): | 6.0000 |
| Average Liquid Height (ft): | 4.0000 |
| Roof Outage (ft): | 454.6667 |
| Roof Outage (Dome Roof) | |
| Roof Outage (ft): | 454.6667 |
| Dome Radius (ft): | 4.0000 |
| Shell Radius (ft): | 2.0000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0081 |
| Vapor Molecular Weight (lb/lb-mole): | 32.0400 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 1.4156 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 519.0816 |
| Daily Average Ambient Temp. (deg. F): | 51.9625 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 513.8725 |
| Tank Paint Solar Absorptance (Shell): | 0.5400 |
| Tank Paint Solar Absorptance (Roof): | 0.5400 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,452.1184 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.1153 |
| Daily Vapor Temperature Range (deg. R): | 19.3870 |
| Daily Vapor Pressure Range (psia): | 0.8748 |
| Breather Vent Press. Setting Range(psia): | 0.0000 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 1.4156 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 1.0351 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 1.9099 |
| Daily Avg. Liquid Surface Temp. (deg R): | 519.0816 |
| Daily Min. Liquid Surface Temp. (deg R): | 509.3881 |
| Daily Max. Liquid Surface Temp. (deg R): | 528.7751 |
| Daily Ambient Temp. Range (deg. R): | 23.3583 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.0284 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 1.4156 |
| Vapor Space Outage (ft): | 456.6667 |
| Working Losses (lb): | 1.9438 |
| Vapor Molecular Weight (lb/lb-mole): | 32.0400 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 1.4156 |
| Annual Net Throughput (gal/yr.): | 1,800.0000 |
| Annual Turnovers: | 3.1914 |
| Turnover Factor: | 1.0000 |
| Maximum Liquid Volume (gal): | 564.0197 |
| Maximum Liquid Height (ft): | 6.0000 |
| Tank Diameter (ft): | 4.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 57.6909 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**500 gal Methanol Tank - Vertical Fixed Roof Tank**
**Salt Lake City, Utah**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| Methyl alcohol | 1.94 | 55.75 | 57.69 |